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Penny-Pinching in the Stock Market: If Cheaper Is Better, How Much Better Is It?

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A stock trades at various prices during a typical market session. And when the price changes, the difference is often only a small percentage of the previous price—just pennies on the dollar.

Because these moment-to-moment price fluctuations usually occur within a narrow range, some investment "how-to" books advise buyers not to hold out for a slight drop in cost, but to buy at the market price. *What if the hoped-for drop doesn't materialize?* they warn. *Either you'll be left empty-handed or—if the stock takes off and you're determined to own it—you'll end up paying more later.*

True enough. But suppose you *can* buy at a discount. If cheaper is better, exactly *how much* better is it? Here are some tools to help you find out.

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Say, you decide to invest in the conglomerate Bozocorp. Bozo's stock is trading at $20 a share, but you're a penny pincher and hope to get it at a 5% discount. Instead of placing a *market* order to buy Bozo at its current price, you place a *limit* order to buy it at $19 or lower. The fates are with you; Bozo takes a dip, and your order is filled that same day at $19, giving you your 5% discount.

The penny pincher's reward: the effect of the discount on total return. Time passes and Bozo does well, climbing to $40. With the stock at this price, penny pinching has added an additional 10.53% to your total return.

How do we know this? Suppose that you invested $3420. At $20 a share, you'd have bought 171 shares. But at $19, you'd have bought 180 shares. When Bozo hit $40, the 171 shares would be worth $6840, but the 180 shares would be worth $7200, earning you an extra $360. Dividing the extra return, $360, by the original investment, $3420, gives the penny pincher's reward, an additional return of 10.53%.

But this is too much work! Penny pinchers want to save time as well as money.

Calculating the reward the easy way. There's an easier way to calculate your reward. Simply multiply the *discount* times your investment's *future value multiple*. The result is the percent of your original investment earned because of the discount.

Buying Bozo at $19 instead of $20 gave you a discount of 5%. And when Bozo's price reached $40, its value was 2.1053 times your discounted purchase price of $19. Multiplying the 5% discount times the 2.1053 future value multiple gives the extra return, 10.53% of your original investment—or $360 on an investment of $3420.

Earlier, when your discounted purchase had only reached a future value multiple of 1.5 (a share price of $28.50), your extra return was 7.5% of your investment—or $257. Later, when it has moved on up to a multiple of 2.75 (a share price of $52.25), your extra return will be 13.75%—or $470.

If Bozo drops to $18—heaven forbid!—your future value multiple will be just .9474. Multiplying that times your 5% discount gives 4.74%. This is the part of your original investment that you will have *avoided losing* because you bought at a discount. If you had bought Bozo at $20, its subsequent drop in price would have *cost* you an extra $162, which is $3420 times 4.74%.

But let us not dwell on unpleasant thoughts.

The effect of the discount on future value. Clearly, a discount increases the future value of your investment. But by what factor? The answer is a lofty-sounding algebraic expression that disguises some down-to-earth arithmetic. The future value is increased by the reciprocal of *1 minus the discount*. Which means what?

Well, if the discount is 5%, then 1 minus the discount is 95%. And the reciprocal of any number is just that number divided into 1; so the reciprocal of 95% is 1/.95, or 1.0526.

By investing your $3420 in Bozo at $19 instead of $20, you have boosted *all* future values of your investment by a factor of 1.0526.

Let's test this. When Bozo reaches $50 a share, an investment at $20 will be worth two and one-half times its original value: $50/$20 = 2.5. But an investment at $19 will be worth 2.6316 times as much: $50/$19 = 2.6316.

If you divide the future value multiple of a purchase at $19 by the future value multiple of a purchase at $20, you'll get the future value improvement factor calculated three paragraphs back, 1.0526. At all times your discounted purchase will be worth 5.26% more than an undiscounted purchase.

It's enlightening to see the long-term dollar benefit of a discount. Suppose you were thirty-five when you plunked down your $3420 for Bozo at $19. And suppose Bozo's price appreciated at an annual rate of 10.5% (near the U.S. stock market's historical average). When you retired at sixty-five, Bozo would be worth $68,400—twenty times its original value. As for that 5.26% increase in future value—that would amount to $3420, your original investment.

The effect of the discount on the share price growth rate. As you would expect, a discount raises the share price growth rate above the value it would otherwise have had. The amount of the increase depends, not only on the size of your discount, but also on the length of time you hold the stock. Let's imagine that Bozo's stock price could grow at 14.87% annually when bought at $20. If that were so, it would grow at 16.05% annually when bought at $19 (a 5% discount) and held for five years.

The relationship works like this. Start with the original growth rate *factor* (which is 1 plus the annual share price growth rate). In our example, it's 1.1487.

Multiply the factor by the y^{th} root of our old friend, the reciprocal of *1 minus the discount*. Finding the y^{th} root is no big deal. That mysterious *y* is just the holding period in years; five, in this case. So we need the 5th root of 1/.95. As we've seen above, 1/.95 equals 1.0526. And the 5th root of 1.0526 (easily found with an inexpensive pocket calculator) is 1.0103.

Multiplying the root, 1.0103, times the original share price growth rate factor, 1.1487, gives us the discount-adjusted growth rate factor, 1.1605. And subtracting 1 from that leaves us with the higher growth rate, 16.05%.

If you held Bozo for less time, the growth rate would be higher still. If you held it for more time, the growth rate would systematically decrease, approaching the original 14.87% rate as the holding period increased to infinity—a holding period achieved by only the most tenacious long-term investors.

Although the effect of the discount on the share price growth rate *decreases* with time, you'll be happy to know that the yearly dollar advantage from the discount actually *increases* with time.

The effect of the discount on appreciation time. If time is money, when can you expect yours?

That depends on the share price growth rate. As the growth rate increases, the time needed to reach a given multiple of your original investment decreases. When Bozo's share price is appreciating at a 14.87% annual clip, your money will double in five years. But when the rate jumps to 16.05% (thanks to your penny pinching), your money will double some four months earlier.

To find out how the discount affects the appreciation time, do this. First, divide the logarithm of the original growth factor by the logarithm of the discount-adjusted growth factor. Then, multiply the result by the *original* time required to reach your chosen multiple. The product is the *discount-adjusted* time required to reach that multiple.

Bozo's original share price growth factor was 1.1487; the logarithm of this factor is .060207 (compliments of our pocket calculator). Bozo's discount-adjusted growth factor is 1.1605; the logarithm of *this* factor is .064645. Dividing the former logarithm by the latter, we get .931. So the discount-adjusted appreciation time needed to double your money is 93.1% of the original five years—which is 4.655 years, a time advantage of slightly more than four months.

Low P/E investing as penny pinching. When you buy at a discounted price you are buying at a discounted price-earnings ratio (P/E). The benefit of penny pinching comes from the discount's effect on the *P/E change factor*.

The P/E change factor is the multiple by which a stock's price-earnings ratio changes from the date of purchase to the date of evaluation—whatever day you check to see how Bozo is doing. The discount boosts the P/E change factor above the value it would otherwise have had.

To find the P/E change factor, divide the evaluation P/E by the purchase P/E. If you buy a stock when its P/E is 12 and sell it when its P/E is 13, the change factor will be 1.083, which is 13 divided by 12.

If you refuse to buy at a P/E of 12, delaying your purchase until you can get a 5% discount, your purchase P/E will drop to 11.4. This reduction in the P/E factor's denominator will cause the factor's value to jump to 1.14, which is 13 divided by 11.4.

Why the P/E change factor is important. The P/E change factor works in combination with the earnings-per-share growth rate factor to determine the share price growth rate.

Don't confuse the growth rate of the *share price* with the growth rate of the *earnings-per-share* (EPS); although related, they are different things. Their relationship is like that of a leashed dog and the person walking it. Sometimes Fido tugs ahead to greet a fellow mongrel, sometimes he drags behind to pay his respects to a favorite fireplug; but his general path is set by the leash-holder. Sometimes the share price growth rate pulls ahead of the EPS growth rate, sometimes it lags behind; but it is always under its influence.

Fido rushes ahead or holds back because of changing scents in his environment. The growth rate of the share price pulls ahead or lags behind that of the EPS because of changing sentiment in the market. The change in market sentiment is measured by the P/E change factor.

When the P/E change factor is greater than 1, it boosts the share price growth rate above the EPS growth rate. When it is less than 1, it drags the share price growth rate below the EPS growth rate.

Regression to the mean. By buying a stock at a discount to the market price, you insure a higher value for the P/E change factor. Still, you shouldn't expect the change factor to rise above 1 (and boost the share price growth rate) unless the value of the purchase P/E itself is lower than normal.

A stock bought at a discount to its average P/E can reasonably be expected to regress upward to the mean—its normative value—provided that the events which pushed the P/E below its average have not permanently weakened the company. If the P/E *does* return to its mean value, the P/E change factor will go above 1 and the share price growth rate will exceed that of the EPS.

But beware! P/E's that are modestly discounted to historical *highs* are more likely to drop than rise—in which case your discount merely cushions the fall.

Because of the phenomenon of regression to the mean, a stock having a puny EPS growth rate, but selling at a below-average P/E, can show an impressive share price appreciation if a change in market sentiment drives the P/E back up into its normal range.

Suppose you buy a stock having an annual EPS growth rate of 4% and selling at a 20% discount to its average P/E. If the market over a period of three years gradually pushes the P/E back to its average, your annual share price growth rate for the period will be 12%.

Let's prove this. A stock selling at a 20% discount to its average P/E must boost its current P/E by a factor of 1.25 in order to return to its average. This P/E change factor is none other than that ubiquitous party-crasher, the reciprocal of *1 minus the discount*: 1/(1-20%) = 1/.8 = 1.25.

For a holding period of three years, the annual share price growth factor will equal the product of 1.04 (the annual EPS growth factor) times 1.077 (the third root of the P/E change factor—*third* root because we're holding the stock for *three* years). That product is 1.12, and subtracting 1 from it leaves our share price growth rate, 12%.

Implied P/E discounts in brokerage recommendations. If word gets around that you buy stocks, look out! The infestation of brokerage recommendations swarming through your mailbox will be the envy of every locust in Kansas.

One such recommendation, hatched by some analyst named Aurora, landed in mine today. A mere paragraph long, it concludes with the ever-popular *Purchase Recommended*. Aurora begins by quoting the stock's recent price ($56^{7}/8$), goes on to talk about its earnings growth rate, and wraps up with a 12-month target price (65).

A target price is two forecasts parading around in a horse suit. Look inside and you'll find—working in tandem—the analyst's predictions for: (1) the EPS growth rate, and (2) the P/E change factor. Aurora says that earnings will grow 10% annually, but she says whatsoever nothing about the P/E.

She's also mum on the share price growth rate, but you can deduce that; divide the 12-month target price by the current price, then subtract 1. Her implied (but unstated) prediction for the share price growth rate is 14.29%, much higher than the 10% she predicts for the EPS.

If 10 of her 14.29 percentage points are coming from the EPS growth rate, where are the remaining 4.29 points coming from? They're coming from a jump in the P/E. What Aurora knows, but isn't saying, is this: 30% of the predicted $8.13 price rise is predicated on a positive change in market sentiment!

Her sixty-five dollar target price implies that the stock's current P/E stands at a 3.75% discount to some *unspecified* market standard. How were we able to isolate her implied discount?

Just a minute ago, when we divided the target price by the current price, we got the 12-month share price growth multiple, 1.1429. If we go on to divide that by the 12-month EPS growth multiple, 1.10, we'll get the 12-month P/E change factor, 1.039.

Now, as we've seen previously, the P/E change factor is the reciprocal of *1 minus the discount*. So this particular P/E change factor, 1.039, equals 1/.9625, which equals 1/(1-3.75%). Thus, the stock is selling at a 3.75% discount. But to what? Who knows?

In order for the recommended stock to hit the 12-month target price, its EPS must grow by 10% *and* its P/E ratio must increase by 3.9%.

Thinking of taking aim? Ask yourself, *Do I feel lucky today?* (Well, do you?) Unless you know how the current P/E stacks up against its historical norm, probably not.

Penny pinching vs. greed mongering. We conclude with a financial assessment of two psychological types, penny pinchers and greed mongers. In the process we introduce a novel financial ratio, the Parsimony-Avarice Factor.

Consider two scenarios for Bozo at a market price of $20.

- A penny pincher with $3420 to invest waits until Bozo drops to $19 (a 5% discount to the market price); then he buys it. He holds it until it's worth $40; then he sells it.
- A greed monger with $3420 burning a hole in his pocket immediately buys Bozo at $20. He holds it until it's worth $40. But—anxious for more—he hangs on until it climbs to $42 (a 5% premium to the penny pincher's "good-bye" price). Then *he* sells it.

Who made more money? The greed monger got $7182. But the penny pincher came away with $7200.

Given the choice of an *x%* discount off the greed monger's purchase price versus the *same* percent premium added onto the penny pincher's sale price, the discounted purchase will outperform the premium sale by the Parsimony-Avarice Factor, which is the reciprocal of *1 minus the discount-squared*.

Our example, with its 5% discount and premium, works out like this: $1/(1\text{-}5\%^2)$ becomes 1/(1-.0025), then 1/.9975, and finally 1.0025. This is the same factor you'll get if you divide the greed monger's $7182 into the penny pincher's $7200.

And so our story ends with parsimony edging out avarice. By $18. That's eighteen hundred extra coppers—coined in the mint of discipline and jingling in the pockets of the penny pincher's pants. Not a lot, of course. But—as *all* pinchers know—*every* penny counts.

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